REMARKS

The specification and claims are amended to improve the clarity of expression and to correct an inconsistency in the description of the process steps. In particular, Examiner notes that the sequence of process steps recited at page 5 and page 15 conflict with each other. The specification is amended at page 5 to recite a sequence of steps consistent with the description at page 15. The amendments are supported by the specification and claims as originally filed. No new matter is added.

Claims 1, 4-10 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicant traverses the rejection to the extent that it can be maintained.

The specification and claims are amended to eliminate the inconsistency in the sequence of process steps noted by Examiner. Examiner is respectfully requested to withdraw the rejection on this ground.

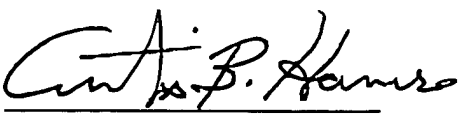
Attached hereto is a marked-up version of the changes made to the claims. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, Curtis B. Hamre (Reg. No. 29,165), at (612) 336-4722.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903
(612) 332-5300

Dated: May 27, 2003

By 

Curtis B. Hamre
Reg. No. 29,165

09/382,182

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification

Paragraph beginning at page 5 line 5.

Namely, according to the present invention, a method of forming a multi-layer wiring structure, comprising the following steps is provided:

etching via-holes or wiring gutters through a resist mask on a silica based insulating film between layers [of silica systems] which has [have] a dielectric constant equal to or less than 3.5;

[filling up said wiring gutters or said via-holes with conductive material; and]

performing an ashing process on said resist mask using oxygen gas plasma under an atmospheric pressure from 0.01 Torr to 30.0 Torr[.]; and

filling up said wiring gutters or said via-holes with conductive material.

Paragraph beginning at page 5 line 24.

The silica based insulating film between layers [of silica system] must have a dielectric constant being equal to or less than 3.5. An organic SOG and inorganic SOG can be listed as a coating liquid for forming such a film. As such the organic SOG, it is appropriate to have a content of carbon lying from 5 % by weight to 25 % by atomic weight, for example, and more preferably, the content of carbon is from 8 % by weight to 20 % by atomic weight.

Paragraph beginning at page 13 line 3.

Also, with a method for forming the silica based insulating film between layers [of silica systems], for example, the coating liquid is applied or coated on a surface of a substrate, such as, semiconductor substrate, a glass substrate, a metal substrate, a ceramic substrate or the like, by means of, such as, a spinner method, a roll coating method, a dip and pull up method, a spray method, a screen printing method, a brush painting method, and so on, and is is dried by

evaporation of the solvent so as to form the coated film therewith. Then, the insulating film is formed by baking it in a temperature from 250 °C to 500 °C.

Paragraph beginning at page 20 line 15.

As is fully described in the above, according to the present invention, in the method for forming a multi-layer circuit board, by etching via-holes or wiring gutters through a resist mask on [an] a silica based insulating film between layers [of silica systems] having a dielectric constant being equal to or less than 3.5, and filling up said wiring gutters or said via-holes with conductive material by using the damascene method, wherein the ashing process is performed on said resist mask with oxygen gas plasma under an atmospheric pressure from 0.01 Torr to 30.0 Torr (more preferably, from 0.01 Torr to 1.2 Torr), the bonding is hardly cut between Si and organic radical or between Si and hydrogen radical, constituting the insulating film between layers of silica, thereby maintaining a low in the dielectric constant thereof.

In the Claims

1. (TWICE AMEND) A method for forming a multi-layer wiring structure, comprising the following steps:

etching via-holes or wiring gutter through a resist mask on [an] a silica based insulating film between layers [of silica systems] having dielectric constant being equal to or less than 3.5;

[filling up said wiring gutters or said via-holes with conductive material; and]

performing an ashing process on said resist mask using oxygen gas plasma under an atmospheric pressure from 0.01 Torr to 30.0 Torr[.]; and

filling up said wiring gutters or said via-holes with conductive material.

3. (TWICE AMEND) A method for forming a multi-layer wiring structure, as described in claim 1, wherein said silica based insulating film between layers [of silica systems] contains carbon from 5 % by atomic weight to 25 % by atomic weight.

4. (TWICE AMEND) A method for forming a multi-layer wiring structure, as described in claim 1, wherein said silica based insulating film between layers [of silica systems] is formed by coating and baking a coating liquid including a chemical compound, being obtained through hydrolysis and condensation reaction of at least one kind of alkoxysilane compounds in organic solvent under presence of an acid catalyst, wherein said one kind of alkoxysilane compounds is selected from alkoxysilane compounds expressed by the following general equation(I):

$$R_nSi(OR^1)_{4-n} \quad \text{.....(I)}$$

wherein, R in the general equation (I) indicates an alkyl group having carbon number from 1 to 4 or an aryl group, R^1 indicates an alkyl group having carbon number from 1 to 4, and n indicates an integer from 1 to 2.

8. (TWICE AMEND) A method for forming a multi-layer circuit board, as described in claim 1, wherein said silica based insulating film between layers [of silica systems] is formed by coating with a coating liquid, and baking said coating liquid, which is obtained from a solution of a solvent of alkyleneglycol-dialkyl ether containing acid hydrolysis condensation product of trialkoxysilane, and which shows an increase in weight when performing thermogravimetric measurement on a component forming the film after removing the solvent.

9 (AMEND) A method for forming a multi-layer wiring structure, comprising the following steps:

(a) etching to form via-holes or wiring gutters through a resist mask on a silica based insulating film between layers [of silica systems] having a dielectric constant being equal to or less than 3.4, said silica based insulating film between layers [of silica systems] containing carbon from 5% by atomic weight to 25% by atomic weight;

[(b) filling up said wiring gutters or said via-holes with conductive material; and]

(b) performing an ashing process on said resist mask using oxygen gas plasma under an atmospheric pressure from 0.01 Torr to 30.0 Torr[.]; and

(c) filling up said wiring gutters or said via-holes with conductive material.